

REMARKS

The current disposition of the claims is as follows:

- (A) Claims 45-58, 84, 105 and 122-142 were pending.
- (B) Claim 132 stands allowed.
- (C) Claims 47-51, 53, 54, 123, 124, 137, 138 and 142 stand objected to.
- (D) Claims 45, 46, 52, 55-58, 105, 122, 125-131, 133-136 and 139-141 stand rejected.
- (E) Claims 46, 47, 48 and 137 have been canceled without prejudice or disclaimer.
- (F) Claims 45, 49-54, 56, 58, 84, 105, 125, 136, 138, 140 and 142 have been currently amended.
- (G) New claims 143-150 have been added.
- (H) Thus claims 45, 49-58, 84, 105, 122-136, and 138-150 are pending for consideration.

The highest amount of claims previously paid for was 97, including 26 independent claims. There are currently 41 claims pending, of which 12 are independent.

The specification was objected to.

Applicants respectfully request reconsideration of the objections/rejections stated in the Office Action in view of the following remarks.

Objections to the Specification

Paragraph 2 Objections:

Paragraph Number 2 of the Action stated that,

“the specification fails to identify the following structures as structures capable of being augmented or disrupted: liver, muscle, feet, kidney, spleen, blood, lung, lens of eye, aqueous humor, vitreous humor, animal cell (only complete animals, not cells targeted), plant cell (again, only plants targeted, not specific cells), molecules, plasma membrane, cytoplasmic inclusion body, basal body, appendages, skin, shell, egg and endoplasmic reticulum.”

To assist the Examiner and to overcome this objection to the specification, Applicants have below listed at least one portion of the specification which contains reference to each of the structures set forth in Paragraph Number 2 of the Action.

1. Liver: Page 17, line 32
2. Muscle: Page 17, line 32.
3. Feet: Page 49, line 7.
4. Kidney: Page 18, line 1.
5. Spleen: Page 18, line 1.
6. Blood: Page 18, line 1.
7. Lung: Page 18, line 1.
8. Lens of Eye: Page 18, line 2.
9. Aqueous humor: Page 18, line 2.
10. Vitreous humor: Page 18, line 2-3.
11. Animal cell: Page 19, Table 1.
12. Plant cell: Page 19, Table 1.
13. Molecules: Page 19, Table 1; and page 3, line 14.
14. Plasma membrane: Page 42, line 12.
15. Crytoplasmic inclusion body: Page 42, line 13.
16. Basal body: Page 42, line 13.
17. Appendages: Page 53, lines 23-24; and Example 4.
18. Skin: Page 28, line 6.
19. Shell: Page 9, line 2; page 45, line 19; and page 53, line 30.
20. Egg: Page 9, line 2; and page 53, line 30.
21. Endoplasmic reticulum: Page 9, line 14.

Additionally, Applicants point out the definition of “Biologic structure” which occurs at page 3 of the specification. In particular, the following is quoted from page 3, lines 13-15:

“Biologic structure” as used herein and used interchangeably with organic includes anything from the smallest organic or biochemical ion or molecule, to cells, organs, and entire organisms.”

Further, in general, page 4, lines 19-28 (reproduced below for the convenience of the Examiner); page 5, lines 10-12 (reproduced below for the convenience of the Examiner); page 5, lines 24-28 (reproduced below for the convenience of the Examiner); and page 6, lines 17-20 (reproduced below for the convenience of the Examiner) expressly disclose certain generic and broad reaching inventive aspects of the invention.

Page 4, lines 19-28:

“The present invention provides methods to selectively detect, identify and/or affect an inorganic or biologic structure by using resonant acoustic and/or acousto-EM energy which can transfer useful energy to targeted structures while leaving nearby structures, which are not in resonance, virtually unchanged.

Therefore, it is an object of the present invention to provide a method of identifying or detecting an inorganic or biologic structure using its resonant acoustic and/or acousto-EM energies.

It is an object of the present invention to provide a method using resonant acoustic and/or acousto-EM energies to augment and/or disrupt the growth and/or function of biologic structures.”

Page 5, lines 10-12:

“Also, depending on the size, shape, and composition of the biologic structure, there can be more than one naturally occurring resonant acoustic frequency, as well as numerous subharmonic and superharmonic resonant acoustic frequencies.”

Page 5, lines 24-28:

“Thus, the induction of acoustic resonance in a structure leads to the production of a unique acousto-EM signature for that structure, which can be used to detect and/or identify it as disclosed in the present invention. Conversely, if a structure is targeted with EM energy equivalent to its acousto-EM signature, the energy dissipation pathway is reversed, and a state of acoustic resonance can be induced.”

Page 6, lines 17-20:

“Although not previously postulated by others, biologic structures functioning as living, resonant piezoelectric transducers which modulate the conversion of mechanical and EM energy is undoubtedly one of the major underlying mechanisms responsible for the interaction of EM fields with biologic structures.”

In general, the above cited portions of the specification (as well as in numerous other uncited portions of the specification) disclose the novel aspects of the invention namely, that depending on size, shape and composition of, for example, a biologic structure, there is at least one naturally occurring resonant acoustic frequency. The definition of “biologic structure” (reproduced above herein) includes anything from the smallest organic or biochemical ion or molecule, to cells, organs and entire organisms. Further, the specification expressly discloses an interchangeability between acoustic energy and electromagnetic energy to achieve the state of acoustic resonance in the targeted biologic (see for example page 5, lines 24-28 (reproduced above herein)).

It is clear from the present specification that ANY biologic structure can be augmented, disrupted and/or identified, based on the detailed teachings contained in the present specification.

Namely, once an appropriate acoustic or acousto-EM signature is provided to the biologic structure to achieve resonance, that resonance can be disruptive, or it can augment, as presently claimed.

The disclosed (and claimed) invention has not been previously postulated by others namely, that biologic structures may function as living, resonant piezoelectric transducers which modulate conversion of mechanical and electromagnetic energy depending on frequencies and exposures. This may be one of the major underlying mechanisms responsible for the interaction of both electromagnetic and acoustic fields with biologic structures (see, for example, page 6, lines 17-20 (reproduced above herein)).

In view of the above remarks, Applicants respectfully request the objection to the specification cited in Paragraph Number 2 of the Action be withdrawn.

Paragraph 3 Objections:

Paragraph Number 3 of the Action objected to the specification because:

“the specification fails to identify the following functions as being augmented by being an organism being placed in acoustic resonance: reproduction, regeneration, embryogenesis, metabolism, germination, and oxidation or reduction activity.”

To assist the Examiner and to overcome the objection to the specification, Applicants have listed below at least one portion of the specification that contains reference to the functions referred to in Paragraph number 3 of the Action.

1. Reproduction: Page 8, line 30.
2. Regeneration: Page 8, line 31.
3. Embryogenesis: Page 8, line 31.
4. Metabolism: Page 8, line 31.
5. Germination: Example 10.
6. Oxidation or reduction activity: Page 43, line 18.

These specific functions are some of the functions that occur in the disclosed and claimed “biologic structures.” In view of the above remarks, Applicants respectfully request the objection to the specification cited in Paragraph Number 3 of the Action be withdrawn.

Claim Rejections – 35 USC § 112

Paragraph 5 Rejections:

Claims 55-57 were rejected under 35 USC § 112, first paragraph, as failing to comply with the enablement requirement. Applicants respectfully traverse this rejection. In general, a number of

specific structures are recited in claims 55-57 (as well as in newly added claims 143, 144 and 145). The Action references some of the structures and alleges that only disruption, rather than augmentation, is disclosed in the present specification. Applicants provide the Examiner with the following remarks.

The present invention discloses at page 3 the definition of “biologic structure” (reproduced above herein). “Biologic structure” is disclosed as being **“anything from the smallest organic or biochemical ion or molecule, to cells, organs, and entire organisms.”** Further, the present specification at page 4, lines 19-28 (reproduced above herein) disclose the processes of detecting, identifying and/or affecting inorganic or **biologic structures** by using resonant acoustic and/or acousto-EM energy...and such resonant acoustic and/or acousto-EM energies can **augment** and/or **disrupt** the **growth** and/or **function** of **biologic structures** (emphasis added).

Further, the present specification at page 5, line 7 – page 6, line 4 discloses clearly that the resonant acoustic frequency of a biologic system is the natural free oscillation frequency of the system. Depending on the size, shape and composition of the biologic structure, there can be more than one naturally occurring resonant acoustic frequency, as well as numerous subharmonic and superharmonic resonant acoustic frequencies. Energy that is trapped in a structure can enhance the structure’s functions or cause disruption of the structure. The same energy can produce different results, depending on, for example, the intensity of such energy. Determination of resonant acoustic frequencies of various biologic structures is discussed at page 8, line 6 – page 9, line 4. In particular, a resonant acoustic frequency of a biologic structure may be determined by:

(1) applying acoustic energy to the biologic structure and scanning through a range of acoustic energy frequencies; and

(2) detecting at least one specific frequency which causes a maximum signal output from the biologic structure indicating the biologic structure being induced into acoustic resonance by the at least one specific frequency.

Certain specific frequencies that cause the maximum signals are the resonant acoustic frequencies of the biologic structure. Once determined, at least one resonant acoustic frequency may be applied to the biologic structure to affect functioning therein. Again, depending on the power intensity of the provided energy and the type of targeted structure that is induced into acoustic resonance, the structure may have its functions affected, such affecting includes disruption and/or augmentation. Typically, at lower power levels the functions of the biologic structure can be augmented, while at higher power levels disruption of the biologic structure may occur. Augmentation, as used in the specification, encompasses beneficial effects on the biologic structure.

Applicants respectfully submit that the present specification repeatedly discloses that any organism can be placed in acoustic resonance and the specific frequencies which cause a maximum signal output from the biologic structure can be detected. In one embodiment of the claimed invention, those frequencies can then be applied to the biologic structure. Once such frequencies are applied, positive and negative effects can be achieved.

While page 9 of the present specification expressly discloses disruption of many of the structures referred to in Paragraph Number 5 of the Action, these same structures are discussed as being augmented in other portions of the specification. For example, Example 1 in the specification discloses “Disruption, Augmentation, Detection and/or Identification of Viruses.” While at first glance the assumption may be that the specification only discloses disruption of viruses, there are occurrences (in life as well as in the specification) where augmentation of viruses (or portions thereof) are desirable. See for example, page 25, lines 6-9; page 34, lines 25-26; page 36, lines 27-28; page 37, lines 8-9; and page 40, lines 20-21.

Further, Example 2 discloses expressly augmenting and disrupting bacteria. Page 41, lines 14-18 have been reproduced below for the convenience of the Examiner.

Page 41, lines 14-18:

“Any micro-organism, such as bacteria, as well as structure and molecules contained or associated herewith, may be augmented, disrupted, detected and/or identified *in vitro* or *in vivo* using the methods of the present invention. Bacteria include, but are not limited to, those associated with animals, man, avians, reptiles, amphibians, insects, aquatic like, plants, fruit, soil, water, oil, fermentation processes for food production, and the like.”

See also page 42, lines 5-15 reproduced below.

Page 42, lines 5-15:

“Bacterial cell walls are composed of rigid peptidoglycan (mucopeptide or murien), a mixed polymer of hexose sugars (N-acetylglucosamine and N-acetyl muramic acid) and amino acids (the structural units of proteins, see below). As such, the cell walls are crystalline structures and are subject to vibrational effects from the use of acoustic energy. Thus bacteria are susceptible to augmentation, identification and detection, or disruption by resonant acoustic frequencies matched to their shape (sphere or cylinder), size, and composition. In addition, various organelles contained within the bacteria structure are also susceptible to specific resonant acoustic frequencies (i.e., pili, plasma membrane, flagellum, cytoplasmic inclusion bodies, basal bodies, capsule, spores, etc.). Finally, the compounds comprising the structure itself (crystalline proteins, etc.) also have unique resonant frequencies.”

Accordingly, in view of the above remarks, Applicants respectfully submit that claims 55-57 (and newly added claims 143-145) are enabled by the current specification and respectfully request withdrawal of the rejection under 35 USC § 112.

Paragraph 6 Rejections:

Claims 55-57 stand rejected under 35 USC § 112, first paragraph, as failing to comply with the written description requirement. Applicants respectfully traverse this rejection.

Applicants appreciate the distinction between a §112 enablement rejection and a §112 written description rejection. However, in the interest of brevity, Applicants believe that the written description rejection has been overcome by the comments provided above herein. Accordingly, those arguments shall not be repeated here. Applicants respectfully request withdrawal of this § 112 rejection.

Paragraph 7 Rejections:

Claims 122, 126-131, and 133-135 stand rejected under 35 USC § 112 first paragraph. In particular, the Action alleges "...while being enabling for utilizing acoustic resonance to augment the growth of an aquatic species, does not reasonably provide enablement for utilizing electromagnetic resonance to augment the growth of an aquatic species." Applicants respectfully traverse this rejection.

The present specification clearly discloses an interesting interchangeability between acoustics and electromagnetics. For example, page 3, lines 10-12 disclose that electromagnetic energy is produced by a structure as acoustic energy interacts with the structure. Further, an acousto-EM signature is defined as an electromagnetic energy pattern of an object in acoustic resonance and/or an electromagnetic energy equivalent in frequency to the resonant acoustic frequency (see, for example, page 3, lines 23-25). Still further, page 4, lines 9-10 define a "resonant acousto-EM energy" as **electromagnetic energy or field that induces acoustic resonance in a structure**. Further, the specification at page 5, line 13 – page 6, line 4 discloses the interchangeability between electromagnetic energy and acoustic energy. A portion of the cited portion of the specification is reproduced below (namely page 5, lines 24-31).

"Thus, the induction of acoustic resonance in a structure leads to the production of a unique acousto-EM signature for that structure, which can be used to detect and/or identify it as disclosed in the present invention. Conversely, if a structure is targeted with EM energy equivalent to its acousto-EM signature, the energy dissipation pathway is reversed, and a state of acoustic resonance can be induced. Reversing the energy dissipation pathway with an acousto-EM signature can be

used to produce the same augmentation, detection, and disruption effects that the original resonant acoustic energy field produces.”

Other portions of the specification disclose these same concepts, namely, that an applied or provided electromagnetic energy can result in acoustic resonance within, for example, a biologic structure, so long as the electromagnetic energy is at the correct frequency to achieve acoustic resonance. This is one important aspect of the claimed invention never before recognized by those of skill in the art.

Further, Applicants also point the attention of the Examiner to page 54, lines 13-19, reproduced below, which disclosure is also applicable to aquatic species, or the like.

Page 54, lines 13-19:

“The present invention takes advantage of the discrete shape and size of numerous organisms to make use of resonant acoustic and/or acousto-EM frequencies specific to those organisms, for purposes of augmentation, identification, detection and/or disruption. Using the piezoelectric, intrinsic energy dissipation, acoustoelectric, and/or magnetoacousto effects, the invention has the potential to produce the above results using electromagnetic energy pattern of the specific acousto-EM signature, either alone or in combination with a resonant acoustic field.”

Accordingly, Applicants respectfully request withdrawal of the grounds of rejection contained in Paragraph Number 7 of the Action.

Paragraph Number 9 of the Action rejected claims 125 and 140 under 35 USC § 112. Applicants appreciate the helpful comments of the Examiner. In this regard, claims 125 and 140 have been amended, thereby rendering this § 112 rejection moot.

Claim Rejections – 35 USC § 102

Claims 45-46, 52, 55, 56, 58, 105, 136, 139 and 141 stand rejected under 35 USC § 102(b) as being anticipated by Thomas H F A (BE 1010049A3) (“Thomas”).

Applicants have attempted to obtain an English language version of Thomas. No such English language version exists. Applicants successfully obtained the Dutch language version of Thomas and have obtained a partial translation thereof. That partial translation suggests that reliance on Thomas as a § 102 reference is not appropriate. However, because Applicants do not yet have a technically accurate and complete translation of Thomas, Applicants have opted to amend all of the pending claims (and have added new claims) all of which incorporate subject matter previously indicated as being allowable by the Examiner. Accordingly, Applicants respectfully submit that the § 102 rejection over Thomas has been overcome due to amendments to the claims.

However, Applicants reserve the right to broaden the currently pending claims should they desire to do so after receiving a technically accurate translation of the Dutch language version of Thomas.

Applicants appreciate the indication of allowable subject matter in claims 47-51, 53-54, 84, 123-124, 137-138 and 142, as well as in claims 57, 125 and 140. Applicants also appreciate the allowance of claim 132.

As stated above, Applicants believe that all currently pending claims now contain limitations that should render each and every claim to be allowable based on the statements contained in Paragraphs 13-16 of the Action.

Applicants appreciate the Examiner's "Response to Arguments" provided in the Action. Applicants believe that all issues contained therein have been addressed in the above response.

Accordingly, Applicants respectfully request issuance of a Notice of Allowability directed to claims 45, 49-58, 84, 105, 122-136, and 138-150.

Should the Examiner deem that any further action by Applicants should be desirable, the Examiner is invited to telephone Applicants' undersigned representative.

Respectfully submitted,



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